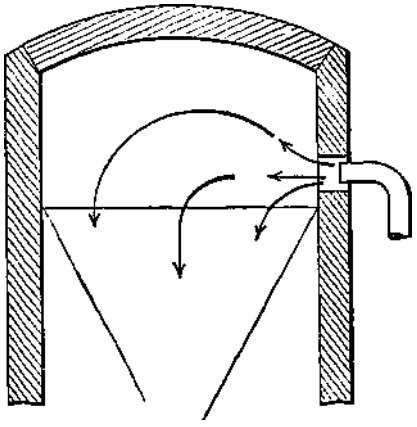
without encountering any obstruction to delay it and flows into the space below the dome. Accordingly, the rising column of flaming gases passes upward without filling the combustion chamber and is surrounded by an atmosphere of unburned relatively colder gases, through which it passes. Direct observation of the combustion of blast furnace gas in the Cowper hot-blast stove shows that, as the ratio between the gas and the air supply approaches the theoretical requirements, combustion ceases to be silent and becomes noisy. The flame commences to jet out around the gas burner in bursts, indicating a temporary extinguishment of the flame in the combustion chamber, which is immediately filled with a comparatively cold



explosive mixture.

Everything indicates that the correct location for the combustion chamber of the Cowper stove is the dome or space above the checkerwork. The streams of flame which are produced cannot pass directly out of this chamber, but are held under the dome, heating its walls from below. The dome forms a permanent firebox for their combustion. Below the dome of the Cowper stove, therefore, there is a stationary hot zone, which burns

those portions of the gases which have not been utilized in the combustion chamber, as soon as they come into contact with the heated chamber. For these reasons the construction of a Cowper stove with the combustion chamber located elsewhere than in the dome is fundamentally wrong.

However, if the gas and the air are simply introduced above the checkerwork of the stove, as is shown in Fig. 72, there is evidently danger that a portion of the cold gas and air, in place of entering into the reaction of combustion and forming a flame, will drop down to the bottom of the stove, through

FIG. 72.

the checker openings, just as a heavy liquid will sink downward through a light liquid. In order to prevent this occurrence, which is undesirable and